

# Impact of Loop Corrections to the Trilinear Higgs Couplings and Interference Effects on Experimental Limits

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We investigate the reliability of a comparison between the experimental results and the theoretical predictions for the pair production of the 125 GeV Higgs boson at the LHC. Recent experimental results for di-Higgs production provide already sensitivity to triple Higgs couplings (THCs) in models beyond the Standard Model (BSM). In our analysis within the Two Higgs Doublet Model (2HDM) we find that potentially large higher-order corrections to the trilinear couplings and the interference effects arising from additional heavy states have a strong impact on the expected shape of the differential cross section and the value of the total cross section. Both effects have to be taken into account for a correct interpretation of the experimental results. In particular, we demonstrate that neglecting the interference of the contributions of heavy Higgs resonances with non-resonant (background) diagrams, as done by the experimental collaborations, can lead to unreliable exclusion limits.

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